

REMARKS/ARGUMENTS

Claims 1-13 stand rejected in the outstanding Official Action. Claims 1, 7, 9 and 13 have been amended and therefore claims 1-13 remain pending in the application.

The Examiner's acknowledgement of the application's claim to priority is appreciated. In addition, Applicant thanks the Examiner for the approval of the drawings submitted on November 17, 2003, as well as the consideration of the Information Disclosure Statement filed on May 16, 2006, May 27, 2004 and November 17, 2003.

The Examiner has rejected claims 7-13 under 35 U.S.C. § 101 as claiming non-statutory subject matter. Regarding independent claim 7, the Examiner indicated on page 2 of the Office Action that it contains software program instructions and as such it does not comply with the 101 section of the code. In response Applicant has amended the language of claim 7 to recite physical components and define the relationships between the physical components and the computer instructions. For example, "receiving circuitry" which receives the interrupt command is claimed. Also, various circuits are recited including a "handling circuitry", "suspending circuitry" and "execution circuitry" are recited along with specified interrelationships between the circuits and the software commands. Therefore it is believed that the amended claim 7 overcomes the 101 rejection of the Office Action. Claims 8-12 depend on claim 7 and as such, they also overcome the statutory subject matter rejection.

Claim 13 has also been amended to make a clear reference to physical medium, such as a computer-readable storage medium, which stores the claimed processing method. Therefore, it is submitted that amended claim 13 has overcome the 101 rejection.

Claims 1-4, 6-10 and 12-13 stand rejected as allegedly being anticipated by Saito (US2005/0149933). The Applicant respectfully traverses this rejection.

Independent claims 1 and 7 are drawn to a method and an apparatus for processing data in a system under control of either a first or a second operating system, wherein different interrupt commands are submitted to the system. The two operating systems are in communication with each other (see Fig. 33 of the specification) such that, for example, the stub interrupt handler operating under control of the first (e.g., non-secure) operating system communicates with a second (e.g., secure) operating system to trigger the main interrupt handler operating under the second operating system. This interrelationship is clear in view of the language in claim 1 (with corresponding language in claim 7): “as commanded by said stub interrupt handling routine, *suspending execution* of said stub interrupt handling routine and *starting* a main interrupt handling routine *executing under control of said second operating system*” (emphasis added). In other words, there control of the first operating system is accomplished by the second operating system. Such is not the case in Saito.

The Examiner makes reference to Fig. 10 of Saito, which discloses a system having two operating systems and two interrupt handlers. The Examiner contends (on page 4 of the Office Action) that the above claimed subject matter is anticipated by item 111 in Fig. 10, i.e., the real-time operating system, which corresponds to one of the two operating systems. However, it is noted that, although the interrupt handler 153 of the real-time operating system 111 is capable of taking an interrupt, this interrupt is *not* initiated by a stub interrupt handling routine executing under control of an operating system *other* than the operating system 111. Thus the claim 1 requirement of a “stub interrupt handling routine executing under control of said **first** operating system” does not start “a main interrupt handling routine executing under control of said **second** operating system” (emphasis added).

In order to anticipate, the Saito interrupt handler 153, operating under the control of the real-time operating system 111, would have to be initiated by another interrupt handler that operates under a different operating system, such as the business-use operating system 110. This clearly doesn't happen and in fact Saito teaches away from such interrelationship.

Specifically, Saito teaches that the common interrupt handler 174 "apportions interruptions that may occur between the interrupt handlers 152 and 153" (See first sentence in [0105]). Based on an "interruption correspondence table" 211, which shows which operating system should handle any given individual interruption, and based on which operating system is the currently executing operating system, the common interrupt handler "assigns" the interrupt task to one of the two operating systems (see [0105]).

The Saito teaching is different from the present invention where, in response to a received interrupt command, an interrupt handler is initiated in one of the two operating systems, and subsequently triggers the initiation of another interrupt handler in the other operating system. In Saito's system, there is only one interrupt handler operating, either under the first or the second operating system, depending on the assignment from unit 174 (which does not execute an interrupt itself). Furthermore, as can be seen from Fig. 10, there is no communication between the business-use operating system 110 and the real-time operating system 111.

For the above reasons, it is respectfully submitted that Saito does not anticipate each and every element of claims 1 and 7, and specifically the claimed limitation: "as commanded stub interrupt handling routine, suspending execution of said stub interrupt handling routine and starting a main interrupt handling routine executing under control of said second operating system;" and therefore the rejection under 35 U.S.C. §102 is not supported.

In addition, it would not have been obvious to one of ordinary skill in the art to modify the method disclosed by Saito so that one interrupt handler operating under one operating system triggers another interrupt handler operating under a second operating system, for at least the reason that Saito teaches away from this feature. As mentioned above, Saito teaches that only one operating system would handle the interrupt command, as the common interrupt handler “apportions” interruptions that may occur between the interrupt handlers 152 and 153 (emphasis added) see [0105]. This language “teaches away” from the joint operation disclosed by the present invention.

The present invention is directed to the problem of more reliably servicing multiple interrupts in a data processing system having more than one operating system. This can be better understood with a reference to Figs. 32 and 33, described in pages 54 and 55 of the description. Fig. 32 explains a problem with some known interrupt handling systems and Fig. 33 explains how such problems are alleviated according to an embodiment of the present invention. As explained in lines 15 to 18, page 55, the starting of the stub interrupt handler in the domain of one operating system (non-secure domain in the particular embodiment) can be regarded as a type of indicator to that one operating system that an interrupt is pending in a different operating system (a secure domain in the particular embodiment).

Furthermore, as explained in lines 1 to 17, page 4, the stub interrupt handling routine of claim 1 is used to ensure that, should an interrupt being handled by one operating system itself be subject to an interrupt, then the handling of both interrupts is sufficiently managed without overlooking the original interrupt that was itself interrupted. Saito neither discloses nor suggests a system for efficiently and effectively dealing with interruption of an interrupt in a system having more than one operating systems.

Claims 2-4, 6 and 8-13 depend from independent claims 1 and 7, respectively, and therefore they are also not anticipated or made obvious by Saito for at least the reasons described above and incorporated herein by reference.

Claims 5 and 11 stand rejected as allegedly being unpatentable over Saito (US2005/0149933) in view of Worley et al. (US2002/0194389). Claims 5 and 11 depend from independent claims 1 and 7, respectively, and therefore they are also not anticipated or made obvious by Saito for at least the reasons described above and incorporated herein by reference.

Furthermore, while Worley discloses a system with multiple operating systems and interruption mechanisms, he does not teach or suggest the limitation of having an interrupt handling routine operating under one operating system trigger another interrupt handling routine operating under a different operating system. Since neither Saito nor Worley, alone or in combination, teach each and every limitation of claims 5 and 11, these claims are believed to be allowable.

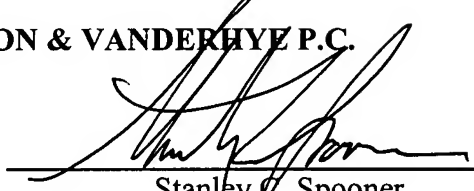
Having responded to all of the rejections set forth in the outstanding Office Action, it is submitted that claims 1-13 are in condition for allowance and notice to that effect is respectfully solicited. In the event that the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact Applicant's undersigned representative.

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Respectfully submitted,

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